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RAW SEQUENCE LISTING DATE: 04/11/2002
PATENT APPLICATION: US/09/915,706A TIME: 12:47:49

Input Set : A:\5112.app
Output Set: N:\CRF3\04112002\I915706A.raw

<110> APPLICANT: NELSON, DAVID R.
<120> TITLE OF INVENTION: A LIVE, AVIRULENT STRAIN OF V. ANGUILLARUM THAT PROTECTS FISH AGAINST INFECTION BY VIRULENT V. ANGUILLARUM
<130> FILE REFERENCE: 5112
<140> CURRENT APPLICATION NUMBER: 09/915,706A
<141> CURRENT FILING DATE: 2001-07-26
<160> NUMBER OF SEQ ID NOS: 4
<170> SOFTWARE: PatentIn Ver. 2.1
<210> SEQ ID NO: 1
<211> LENGTH: 3588
<212> TYPE: DNA
<213> ORGANISM: Vibrio anguillarum
<220> FEATURE:
<221> NAME/KEY: modified_base
<222> LOCATION: (3572)
<223> OTHER INFORMATION: a, t, c, g, other or unknown
<400> SEQUENCE: 1

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ccggaaaggg aaaagtgaaa atagcttttg agatcagcct gttctagcag cttttcaatg 180
atctttttcg tcgttacgtt ttgaaaaatc tgacgactgc gtttgtattg caacaagcta 240
agtggatcca atatctctat ttgataataa aactgctgct tgtctttgct atatcctgtg 300
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 54 ctgctcaatt ccttctcgat accacattag aaagtgctgc gaatagcctt gagtggttag 1560
 55 cggatttaag tgagaagcac tgggatcacc tcaaccctgt actaccagtt gaaacgctca 1620
 56 aatctgatga tgataagggc aaagaaagag agcaagcaga tgcgaaagtt aaagcatttt 1680
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 60 agatggaaaa cgccaaacgt tgtgtcaccc aattagatcg tttgtcagcg ttggtgagca 1920
 61 ctaagtgtca ttctctaggc agtcaaagta ccaacttcgg atttgcgaag tcactgctta 1980
 62 cccgtgttga aaacgctttg gttcatctaa gtggaattaa gttagcaccg aaagcggagg 2040
 63 ccaagacagt agagcaagag gttgccgaaa gttcagtttc tgaaggggag ctgccaagcc 2100
 64 atatggatac aaaacatata gagcgaatac cgatggcatc agagcaggct cagaccgtaa 2160
 65 gccaacactt acacgcagga aacctctctg aactgggtaa tttaaacaat atgaaccgag 2220
 66 acttagcttt ccatttgttg agagaagtct ctgattattt tcgccagagc gaaccgcata 2280
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 85 ttcaggacac aaaccagaat cagaaaaagt tgatttagaa gagcgagagt tcacgggtat 3420
 86 cgataaagac aacttcgata cagtgatggg gcaaattcac ccgcgtcttt cgtacaaggt 3480
 87 tgataacaag cttgctaatg atgatagcca gtttgaagtg aacttgagcc tccgttcgat 3540
W--> 88 gaaagatttc cacccagaga acttagttga tnaaattgag ccgcttaa            3588
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 92 <211> LENGTH: 463
 93 <212> TYPE: PRT
 94 <213> ORGANISM: Vibrio anguillarum
 96 <400> SEQUENCE: 2
 97 Met Pro Leu Ser Lys His Gln Ile Glu Gln Leu Ser Lys Pro Leu Ser
 98   1               5                  10                  15
100 Asp Asp Ser Ile Cys Gly Val Tyr Leu Lys Leu Glu Lys Ser Ala Phe
101              20                  25                  30
103 Arg Pro Leu Arg Asn Glu Phe Asn Val Ala Gln Thr Ala Leu Arg Lys
104          35                  40                  45
106 Leu Ser Gln Asn Pro Ser Ala Asp Glu Arg Asp Ala Leu Gln Glu Ala
107      50                  55                  60
109 Cys Leu Asn Lys Trp Lys Ile Leu Ser Asp Ser Leu Tyr Glu Gln Phe
```

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```
110  65                  70                  75                  80
112 Ser Lys Thr Thr Arg Asp Ile Glu Leu Ile Ser Trp Phe Val Ala Ala
113                  85                  90                  95
115 Gln Phe Leu Leu Asp Thr Thr Leu Glu Ser Ala Ala Asn Ser Leu Glu
116             100                 105                 110
118 Trp Leu Ala Asp Leu Ser Glu Lys His Trp Asp His Leu Asn Pro Val
119         115                 120                 125
121 Leu Pro Val Glu Thr Leu Lys Ser Asp Asp Asp Lys Gly Lys Glu Arg
122     130                 135                 140
124 Glu Gln Ala Asp Ala Lys Val Lys Ala Phe Phe Gln Leu Val Gly Asp
125 145                 150                 155                 160
127 Ser Glu Glu Ser Ser Ile Leu Tyr Ala Pro Val Leu Gln Leu Pro Leu
128                 165                 170                 175
130 Val Gly Glu Val Thr Phe Phe Asp Phe Gln Ser Ala Glu Arg Lys Gly
131             180                 185                 190
133 Glu Ile Ser Gln Leu Lys Ser Met Leu Thr Thr Thr Val Ala Gln Glu
134         195                 200                 205
136 Arg Phe Ala Ile Gln Phe Lys Met Glu Asn Ala Lys Arg Cys Val Thr
137     210                 215                 220
139 Gln Leu Asp Arg Leu Ser Ala Leu Val Ser Thr Lys Cys His Ser Leu
140 225                 230                 235                 240
142 Gly Ser Gln Ser Thr Asn Phe Gly Phe Ala Lys Ser Leu Leu Thr Arg
143                 245                 250                 255
145 Val Glu Asn Ala Leu Val His Leu Ser Gly Ile Lys Leu Ala Pro Lys
146             260                 265                 270
148 Ala Glu Ala Lys Thr Val Glu Gln Glu Val Ala Glu Ser Ser Val Ser
149         275                 280                 285
151 Glu Gly Glu Leu Pro Ser His Met Asp Thr Lys His Ile Glu Arg Ile
152     290                 295                 300
154 Pro Met Ala Ser Glu Gln Ala Gln Thr Val Ser Gln His Leu His Ala
155 305                 310                 315                 320
157 Gly Asn Leu Ser Glu Leu Gly Asn Leu Asn Asn Met Asn Arg Asp Leu
158                 325                 330                 335
160 Ala Phe His Leu Leu Arg Glu Val Ser Asp Tyr Phe Arg Gln Ser Glu
161             340                 345                 350
163 Pro His Ser Pro Ile Ser Phe Leu Leu Glu Lys Ala Ile Arg Trp Gly
164         355                 360                 365
166 Tyr Leu Ser Leu Pro Glu Leu Leu Arg Glu Met Met Ser Glu Gln Asn
167     370                 375                 380
169 Gly Asp Ala Leu Ser Thr Ile Phe Asn Ala Ala Gly Leu Asn His Leu
170 385                 390                 395                 400
172 Asp Gln Val Leu Leu Pro Glu Val Ser Thr Pro Thr Val Gly Ile Glu
173                 405                 410                 415
175 Ser Pro Gln Thr Pro Gln Ala Lys Pro Ser Val Ser Asp Pro Arg Ser
176             420                 425                 430
178 Val Glu Glu His Val Ser Gln Thr Ser Pro Val Asp Thr Gln Ser Lys
179         435                 440                 445
181 Gln Asp Gln Lys Pro Gln Ser Ser Ala Thr Ser Ala Leu Ser Trp
182     450                 455                 460
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RAW SEQUENCE LISTING DATE: 04/11/2002
PATENT APPLICATION: US/09/915,706A TIME: 12:47:49

Input Set : A:\5112.app
Output Set: N:\CRF3\04112002\I915706A.raw

<210> SEQ ID NO: 3
<211> LENGTH: 176
<212> TYPE: PRT
<213> ORGANISM: Vibrio anguillarum
<400> SEQUENCE: 3

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Ala Thr Ile Gly Gln Leu Glu Thr Ala Glu Gly Lys Asn Asp Gly Trp
            20                  25                  30
Phe Ala Ile Asn Ser Tyr Ser Trp Gly Gly Ala Arg Asn Val Ala Met
        35                  40                  45
Asp Ile Gly Asn Gly Thr Asn Ala Asp Ser Gly Met Val Gly Val Ser
    50                  55                  60
Glu Val Ser Val Thr Lys Glu Val Asp Gly Ala Ser Glu Asp Leu Leu
65                  70                  75                  80
Ser Tyr Leu Phe Asn Pro Gly Lys Asp Gly Lys Thr Val Glu Val Ala
                85                  90                  95
Phe Thr Lys Pro Ser Asn Asp Gly Gln Gly Ala Asp Val Tyr Phe Gln
            100                 105                 110
Val Lys Leu Glu Lys Ala Arg Leu Val Ser Tyr Asn Val Ser Gly Thr
        115                 120                 125
Asp Gly Ser Gln Pro Tyr Glu Ser Leu Ser Leu Ser Tyr Thr Ser Ile
    130                 135                 140
Ser Gln Lys His His Tyr Glu Lys Glu Gly Gly Glu Leu Gln Ser Gly
145                 150                 155                 160
Gly Val Val Thr Tyr Asp Leu Pro Thr Gly Lys Met Thr Ser Gly Lys
                165                 170                 175
```

<210> SEQ ID NO: 4
<211> LENGTH: 117
<212> TYPE: PRT
<213> ORGANISM: Vibrio anguillarum
<220> FEATURE:
<221> NAME/KEY: MOD_RES
<222> LOCATION: (113)
<223> OTHER INFORMATION: Variable amino acid
<400> SEQUENCE: 4

```
Met Ala Leu Asn Ser Gln His Lys Arg Val Ser Lys Asn Arg Val Ser
 1               5                  10                  15
Ile Thr Tyr Asp Val Glu Thr Asn Gly Ala Val Lys Thr Lys Glu Leu
            20                  25                  30
Pro Phe Val Val Gly Val Ile Gly Asp Phe Ser Gly His Lys Pro Glu
        35                  40                  45
Ser Glu Lys Val Asp Leu Glu Glu Arg Glu Phe Thr Gly Ile Asp Lys
    50                  55                  60
Asp Asn Phe Asp Thr Val Met Gly Gln Ile His Pro Arg Leu Ser Tyr
65                  70                  75                  80
Lys Val Asp Asn Lys Leu Ala Asn Asp Asp Ser Gln Phe Glu Val Asn
                85                  90                  95
Leu Ser Leu Arg Ser Met Lys Asp Phe His Pro Glu Asn Leu Val Asp
```

RAW SEQUENCE LISTING DATE: 04/11/2002
PATENT APPLICATION: US/09/915,706A TIME: 12:47:49

Input Set : A:\5112.app
Output Set: N:\CRF3\04112002\I915706A.raw

```
     254                 100                 105                 110
W--> 256 Xaa Ile Glu Pro Leu
     257          115
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VERIFICATION SUMMARY DATE: 04/11/2002
PATENT APPLICATION: **US/09/915,706A** TIME: 12:47:50

Input Set : **A:\5112.app**
Output Set: **N:\CRF3\04112002\I915706A.raw**

L:88 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:1
L:256 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:4